IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No. : 10/685,325
Applicant(s): Joanne Law, et al.
Filed: October 14, 2003
TC/A.U.: 2600/2613
Examiner: Dzung D. Tran
Atty. Docket: 10030247-1
Title: SYNCHRONIZING THE FILTER WAVELENGTH OF AN OPTICAL FILTER WITH THE WAVELENGTH OF A SWEPT LOCAL OSCILLATOR SIGNAL

APPEAL BRIEF

Honorable Assistant Commissioner of Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In connection with the Notice of Appeal dated June 21, 2007, and in response to the Notice of Non-Compliant Appeal Brief dated September 19, 2007, Applicants provide the following Appeal Brief in the above captioned application.

TABLE OF CASES

1. W.L. Gore & Associates, Inc. v. Garlock, Inc., 220 USPQ 303 (CAFC 1983).
2. In re Paulsen, 30 F.3d 1475, 31 USPQ2d 1671 (Fed. Cir. 1994)
3. In re Spada, 911 F.2d 705, 15 USPQ2d 1655 (Fed. Cir. 1990).
4. Minnesota Min. & Mfg. Co. v. Johnson & Johnson Orthopaedics, Inc., 976 F.2d 1559, 24 USPQ2d 1321 (Fed. Cir. 1992).
5. Scripps Clinic & Res. Found. v. Genentech, Inc., 927 F.2d 1565, 18 USPQ2d 1001 (Fed. Cir. 1991).

1. Real Party in Interest

The real party in interest as assignee of the entire right and title to the invention described in the present application is Agilent Technologies, Inc., having a principle place of business at 5301 Stevens Creek Blvd., Santa Clara, CA 95051 U.S.A.

2. Related Appeals and Interferences

There are no known related appeals or interferences at this time.

3. Status of the Claims

Claims 1-22 are pending in the present application. Claims 1-22 have been finally rejected. The rejected claims 1-22 are duplicated in the Appendix. The rejection of claims 1-22 is appealed.

4. Status of Amendments

A Final Office Action on the merits was mailed on February 23, 2007. A Reply to the Final Office Action was filed on August 23, 2007 traversing the rejections of the final Office Action. An Advisory Action dated May 22, 2007 was received. In response thereto, a Notice of Appeal was filed on June 21, 2007.

5. Summary of the Claimed Subject Matter[1]

In one embodiment, a method for synchronizing an operating characteristic of a tunable device with the wavelength of a local oscillator signal is provided. The method comprises sweeping the wavelength of the local oscillator signal across a range of wavelengths (702); generating a synchronization signal as the local oscillator signal is swept across the range of wavelengths (704); and adjusting the operating characteristic of a tunable device in response to the synchronization signal (706). The synchronization signal is derived in an open-loop manner from a portion of the local oscillator signal that has not optically interacted with the tunable device. (Kindly refer to claim 1; Figs. 1 and 7; and paragraphs [0017] through [0023] and paragraph [0048] of the filed application.)

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[1] In the description to follow, citations to various reference numerals, drawings and corresponding text in the specification are provided solely to comply with Patent Office Rules. It is emphasized that these reference numerals, drawings and text are representative in nature, and in not any way limiting of the true scope of the claims. It would therefore be improper to import any meaning into any of the claims simply on the basis of illustrative language that is provided here only under obligation to satisfy Patent Office rules for maintaining an Appeal.

In another embodiment, a system for synchronizing an operating characteristic of a tunable device with the wavelength of a local oscillator signal. The system comprises a local oscillator source (102) configured to generate a local oscillator signal (120); a tunable device (108, 608) having an output characteristic that is tunable. In addition, the system comprises a device controller (110, 610) in optical communication with the local oscillator source (102) and in drive signal communication with the tunable device (108, 608). The device controller (110, 610) is configured to generate a synchronization signal derived in an open-loop manner from a portion of the local oscillator signal that has not optically interacted with the tunable device as the local oscillator signal (120) is swept across a range of wavelengths and to generate a drive signal, which sets the operating characteristic of the tunable device, in response to the synchronization signal. (Kindly refer to claim 9; paragraphs [0017] through [0023] and paragraph [0047] and Figs. 1 and 6 of the filed application.)

In another embodiment, a method for monitoring an optical signal utilizing optical heterodyne detection is provided. The method comprises combining an input signal with a local oscillator signal to generate a combined optical signal (802) and outputting the combined optical signal (804). The method also comprises generating an electrical signal in response to the combined optical signal (806) and processing the electrical signal to determine an optical characteristic of the input signal (808). Additionally, the method comprises filtering one of the combined optical signal, the input signal, and the local oscillator signal to pass a wavelength band that tracks the wavelength of the local oscillator signal as the local oscillator signal is swept across a range of wavelengths (810). The method also comprises generating a synchronization signal as the local oscillator signal is swept across the range of wavelengths (812). The synchronization signal is derived in an open-loop manner from a portion of the local oscillator signal that has not been subjected to the filtering. Moreover, the method comprises adjusting the filtering in response to the synchronization signal, where the filtering being adjusted to track the frequency of the local oscillator signal (814). (Kindly refer to claim 19; paragraphs [0017] through [0030] and paragraph [0052]; and Figs. 1 and 8 of the filed application.)

In another embodiment, a system for optical heterodyne detection comprises a first optical path for carrying an input signal (122) and a second optical path for carrying a local oscillator signal (120). The system also comprises an optical combining unit (112), in optical communication with the first and second optical paths. The optical combining unit (112) combines the input signal and the local oscillator signal into a combined optical signal. The system also comprises a third optical path, in optical communication with said optical combining unit, which carries the combined optical signal. Moreover, the system comprises a photodetector (114), in optical communication the third optical path. The photodetector receives the combined optical signal from said third optical path. In addition, the system comprises an optical pre-selector (108) that is optically arranged to filter an optical signal within one of the first, second, and third optical paths. The optical pre-selector has a filter wavelength. The system also comprises a pre-selector controller (110), in drive signal communication with said optical pre-selector (108). The pre-selector controller (110) generates a synchronization signal as the local oscillator signal (120) is swept across the range of wavelengths; and generates a drive signal for the optical pre-selector (108) in response to the synchronization signal. The synchronization signal and drive signal are derived in an open-loop manner in response to a portion of said local oscillator signal that has not optically interacted with said optical pre-selector. (Kindly refer to claim 21; paragraphs [0017] through [0030] and paragraph [0047]; and Figs. 1 and 6 of the filed application.

6. Grounds of Rejection to be Reviewed on Appeal

The issue in the present matter is whether:

I. Claims 1-22 are properly rejected under 35 U.S.C. § 102(e) in view of *Tucker, et al.* (US Patent 7,027,743);

7. Argument

In this portion of the Appeal Brief, arguments are provided. Notably, because no claims have been, Applicants maintain previous arguments for patentability provided in response to Office Actions.

At the outset Applicants rely at least on the following standards with regard to proper rejections under 35 U.S.C. § 102. Notably, a proper rejection of a claim under 35 U.S.C. § 102 requires that a single prior art reference disclose each element of the claim. *See, e.g., W.L. Gore & Assoc., Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303, 313 (Fed. Cir. 1983). Anticipation requires that each and every element of the claimed invention be disclosed in a single prior art reference. *See, e.g., In re Paulsen,* 30 F.3d 1475, 31 USPQ2d 1671 (Fed. Cir. 1994); *In re Spada*, 911 F.2d 705, 15 USPQ2d 1655 (Fed. Cir. 1990). Alternatively, anticipation requires that each and every element of the claimed invention be embodied in a single prior art device or practice. *See, e.g., Minnesota*

Min. & Mfg. Co. v. Johnson & Johnson Orthopaedics, Inc., 976 F.2d 1559, 24 USPQ2d 1321 (Fed. Cir. 1992). For anticipation, there must be no difference between the claimed invention and the reference disclosure, as viewed by a person of ordinary skill in the field of the invention. *See, e.g.*, *Scripps Clinic & Res. Found. v. Genentech, Inc.*, 927 F.2d 1565, 18 USPQ2d 1001 (Fed. Cir. 1991).

I. Rejection of claims 1-22

i. Independent claims 1, 9 and 21

Claim 1 is drawn to a method for synchronizing an operating characteristic of a tunable device with the wavelength of a local oscillator signal. Claim 1 features, *inter alia*:

"*...generating a synchronization signal...wherein said synchronization signal is derived in an open-loop manner from a portion of said local oscillator signal that has* ***not optically interacted with said tunable device.***"

Claim 9 is drawn to a system for synchronizing an operating characteristic of a tunable device with the wavelength of a local oscillator signal. Claim 9 features, *inter alia*:

"...[a] *device controller being configured to generate a synchronization signal derived in an open-loop manner from a* ***portion of said local oscillator signal that has not optically interacted with said tunable device***..."

Claim 21 is drawn to a system for optical heterodyne detection. Claim 21 features, *inter alia*:

"*...a pre-selector controller, in drive signal communication with said optical pre-selector, which generates a synchronization signal as said local oscillator signal is swept across said range of wavelengths and which generates a* *drive signal for said optical pre-selector in response to said synchronization signal, wherein said synchronization signal and said drive signal are derived in an open-loop manner in response to a portion of said local oscillator signal that has not optically interacted with said optical pre-selector*."

As described in the filed application, the tracking of a swept local oscillator (LO) signal does not rely upon feedback from the optical interaction between the LO and a tunable device. (Kindly refer to paragraph [006] of the filed application for support.)

a. Tucker, et al. fails to disclose at least one feature of each of claims 1, 9 and 21

Tucker, et al. fails to disclose at least the open-loop function as recited in claim 1. As noted in the Response under Rule 111 dated November 27, 2006, and again in the Response under Rule 116, dated April 27, 2007, *Tucker, et al.* requires optical interaction between the swept LO signal and the optical pre-selector. Applicants noted that the description of Figs. 5-19 described this interaction, and noted with particularity this interaction as described in connection with Fig. 5.

The Office Action (final) alleges that Fig. 19 of *Tucker, et al.* shows the LO signal from the LO 1905 has not optically interacted with the tunable device 1914, which is an optical preselector. The Advisory Action maintains this assertion. Applicants respectfully disagree.

The optical heterodyne detection system of Fig. 19 of *Tucker, et al.* is the same as the system of Fig. 17 modified to include a clock source. The inclusion of the clock source is used to minimize noise from the dither signal. However, the description of the interaction of the LO signal with the optical preselector provided in connection with Fig. 17 does not change in the embodiment of Fig. 19. In particular, and as described at column 15, line 38 through column 16, line 16; and column 16, lines 33-42 of *Tucker, et al.*:

> "In operation, a **portion of the swept local oscillator signal is tapped off from the swept local oscillator signal at the coupler 1774** of the first optical signal tap 1770. The tapped portion of the swept local oscillator signal is then directed through the signal delay unit 1772, which imparts a delay of time t on the tapped portion of the swept local oscillator signal. The **delayed portion of the swept local oscillator signal is then directed through the optical pre-selector in a transmission direction that is opposite to the direction of the input signal 1702**. The controller 1730 transmits a dither control signal to the optical pre-selector which causes the center frequency of the optical pre-selector to dither. **Dithering of the center frequency of the optical pre-selector imparts a dither on the delayed portion of the swept local oscillator signal that is directed through the optical pre-selector**. A portion of the filtered and delayed local oscillator signal that is output from the optical pre-selector is tapped off from the input fiber 1704 at the second optical signal tap 1736 and directed to the controller. The controller utilizes the tapped portion of the filtered and delayed local oscillator signal as described above with reference to FIG. 9 to cause the center frequency of the optical pre-selector to track the frequency of the swept local oscillator signal. Simultaneous with the tapped portion of the swept local oscillator signal, the untapped portion of the swept local oscillator signal is combined with the filtered input signal as described above with reference to FIG. 12 and the combined optical signal is output to the photodetector." (Emphasis provided).

Clearly, the reference to *Tucker, et al.* discloses a closed-loop technique, which applies a portion of the LO signal (i.e., the delayed LO signal) to synchronize the optical preselector center frequency to the swept LO signal. This is in contrast to claims 1, 9 and 21 the *wherein said synchronization signal is derived in an open-loop manner from a portion of the local oscillator signal has* ***not optically interacted with the tunable device.***

Furthermore, the disclosure of *Tucker, et al.* relating to Fig. 19 does not diverge from the disclosure relating to Fig. 17 as it relates to the described closed-loop technique. In particular, as described at column 16, lines 33-56:

> "In an alternative embodiment for minimizing noise from the dither signal that may leak into the photodetector, the frequency tracking process and the optical filtering process can be separated in time. **FIG. 19 is a depiction of the optical heterodyne detection system of FIG. 17 that has been modified to include a clock source 1946.** The clock source provides a clock signal to the controller 1930, the local oscillator source 1905, and the processor 1916 such that the controller, the local oscillator source, and the processor are synchronized to the same clock signal. **In operation, the local oscillator source and the processor are gated on and off for time t during each clock period of the clock signal. Since the signal delay time t is one half of the clock period, the locking signal at frequency f_{LO-D} is injected into the pre-selector and the optical pre-selector is dithered when the local oscillator source and the processor are off and visa versa.** Alternatively, the processor may be programmed to separate the signal that is received while the local oscillator source is gated on from the signal that is received while the local oscillator source is gated off and the optical pre-selector is dithered. **Either way, the frequency tracking function is carried out while the local oscillator source is gated off and optical spectrum analysis of the input signal is carried out while the local oscillator source is gated on.**" (Emphasis Provided)

Thus, the basic functionality of the closed-loop in system of Fig. 17 is maintained in the system in Fig. 19 of *Tucker, et al.* To this end, Applicants respectfully submit that the tapping of the LO signal and its reverse input to the optical preselector in the system of Fig. 19 is done the same as in the system of Fig. 17; and there is no disclosure to the contrary. The difference between the two systems is the staggering of the frequency tracking and the optical spectrum analysis, and not the closed-loop technique.

Accordingly, and for at least the reasons set forth above, Applicants respectfully submit that the reference to *Tucker, et al.* fails to disclose at least that the *synchronization signal is derived in an open-loop manner from a portion of the local oscillator signal has* ***not optically interacted with the tunable device.*** Therefore, the applied art fails to disclose at least one feature of each of independent claims 1, 9 and 21. As such, a *prima facie* case of anticipation based on the applied art cannot be made and claims 1, 9 and 21 are patentable over the applied art.

ii. Claim 19

a. Claim 19 has not been properly examined

Claim 19 is drawn to method for monitoring an optical signal utilizing optical heterodyne detection. The method features, *inter alia*:

"*…generating a synchronization signal as said local oscillator signal is swept across said range of wavelengths, wherein said synchronization* ***signal is derived in an open-loop manner from a portion of said local oscillator signal that has not been subjected to said filtering…***"

The Office Action (final) appears to have examined claim 19 as though it included features found in independent claims 1, 9 and 21, and not features specific to claim 19. In particular, the Office Action asserts that the reference to

Tucker, et al. discloses:

> **a pre-selector controller 1930, in drive signal communication with said optical pre-selector, which generates a synchronization signal as said local oscillator signal is swept across said range of wavelength and which generates a drive signal for said optical pre-selector in response to said synchronization signal wherein said synchronization signal is derived in an open –loop manner from a portion of said local oscillator signal that has not optically interacted with said tunable device (i.e., Figure 19 shown local oscillator signal from the local oscillator 1905 that has not optically interacted with said tunable device 1914).**

Respectfully, the features of claim 19 reproduced above differ from the features as examined, and thus claim 19 has not been properly examined. Accordingly, the present rejection is improper and should be withdrawn. Moreover, Applicants respectfully request full examination of claim 19 be carried out and provided to Applicants in future correspondence.

b. Tucker, et al. fails to disclose at least one feature of claim 19

The above notwithstanding, Applicants respectfully submit that the applied art fails to disclose at least the *synchronization* ***signal derived in an open-loop manner from a portion of said local oscillator signal that has not been subjected to said filtering*** as specifically featured in claim 19.

As noted above, in describing Fig. 17, *Tucker, et al.* discloses:

> "The controller utilizes **the tapped portion** of the filtered and **delayed local oscillator signal as described above with reference to FIG. 9 to cause the center frequency of the optical pre-selector to track the frequency of the swept local oscillator signal.** Simultaneous with the tapped portion of the swept local oscillator signal, the untapped portion of the swept local oscillator signal is combined with the filtered input signal as

described above with reference to FIG. 12 and the combined optical signal is output to the photodetector."

Thus, the applied art fails to disclose the open-loop configuration as specifically recited in claim 19. Therefore, the applied art fails to disclose at least one feature of independent claim 19. As such, a prima facie case of anticipation based on the applied art cannot be made and claim 19 is patentable over the applied art.

iii. Claims 2-8; 10-18; 20 and 22

Claims 2-8; 10-18; 20; and 22 depend from claims 1, 9, 19 and 21, respectively. Therefore, claims 2-8 are patentable for at least the same reasons as claim 1; claims 10-18 are patentable for at least the same reasons as claim 9; claim 20 is patentable for at least the same reasons as claim 19; and claim 22 is patentable for at least the same reasons as claim 21.

Conclusion

The status of the claims has been revised to clearly indicate that claims 1-22 are rejected and that claims 1-22 are the subject of the present Appeal.

In view the foregoing, applicant(s) respectfully request(s) that the Examiner withdraw the objection(s) and/or rejection(s) of record, allow all the pending claims, and find the application in condition for allowance.

If any points remain in issue that may best be resolved through a personal or telephonic interview, the Examiner is respectfully requested to contact the undersigned at the telephone number listed below.

Respectfully submitted on behalf of:

Agilent Technologies, Inc.

by: William S. Francos (Reg. No. 38,456)

Date: October 19, 2007

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Appendix

Claims on Appeal

Claims on Appeal:

1. A method for synchronizing an operating characteristic of a tunable device with the wavelength of a local oscillator signal comprising:

sweeping the wavelength of said local oscillator signal across a range of wavelengths;

generating a synchronization signal as said local oscillator signal is swept across said range of wavelengths; and

adjusting the operating characteristic of a tunable device in response to said synchronization signal;

wherein said synchronization signal is derived in an open-loop manner from a portion of said local oscillator signal that has not optically interacted with said tunable device.

2. The method of claim 1 including an initial step of setting the operating characteristic of said tunable device and the wavelength of said local oscillator signal to match each other before the wavelength of said local oscillator signal is swept across a range of wavelengths.

3. The method of claim 1 wherein generating said synchronization signal involves generating said synchronization signal in response to wavelength information that is related to said local oscillator signal.

4. The method of claim 1 wherein generating said synchronization signal involves generating said synchronization signal in response to wavelength information that is obtained by measuring said local oscillator signal.

5. The method of claim 1 wherein N discrete synchronization signals are generated at wavelength-dependent intervals.

6. The method of claim 5 wherein said wavelength-dependent intervals are defined by (wavelength.sub.2 -wavelength.sub.1)/N.

7. The method of claim 5 wherein adjusting the operating characteristic of said tunable device involves adjusting the operating characteristic in response to said N discrete synchronization signals.

8. The method of claim 1 wherein said tunable device is one of a tunable optical filter, a tunable laser, and a tunable optical detector.

9. A system for synchronizing an operating characteristic of a tunable device with the wavelength of a local oscillator signal comprising:

a local oscillator source configured to generate a local oscillator signal;

a tunable device having an output characteristic that is tunable; and

a device controller in optical communication with said local oscillator source and in drive signal communication with said tunable device, said device controller being configured to generate a synchronization signal derived in an open-loop manner from a portion of said local oscillator signal that has not optically interacted with said tunable device as said local oscillator signal is swept across a range of wavelengths and to generate a drive signal, which sets the operating characteristic of said tunable device, in response to said synchronization signal.

10. The system of claim 9 wherein the operating characteristic of said tunable

device and the wavelength of said local oscillator signal are initially set to match each other.

11. The system of claim 9 wherein said tunable device exhibits a repeatable relationship between its operating characteristic and an applied drive signal.

12. The system of claim 11 wherein said tunable device is an acousto-optic tunable filter.

13. The system of claim 9 wherein said device controller includes a wavemeter, in optical communication with said local oscillator signal, which generates wavelength information related to said swept local oscillator signal.

14. The system of claim 13 wherein said synchronization signals are generated in response to said wavelength information.

15. The system of claim 14 wherein said device controller further includes a fringe counter connected to receive said wavelength information from said wavemeter and to generate discrete synchronization signals in response to said wavelength information and a drive signal generator connected to receive said discrete synchronization signals from said fringe counter and to generate drive signals in response to said discrete synchronization signals, wherein said drive signals are derived in an open-loop manner in response to a portion of said local oscillator signal that has not optically interacted with said tunable device.

16. The system of claim 14 wherein said device controller further includes a microprocessor connected to receive said wavelength information from said

wavemeter and to generate drive signals in response to said wavelength information.

17. The system of claim 9 wherein N discrete synchronization signals are generated at wavelength-dependent intervals.

18. The system of claim 17 wherein adjusting the operating characteristic involves adjusting the operating characteristic in response to said N discrete synchronization signals.

19. A method for monitoring an optical signal utilizing optical heterodyne detection, the method comprising:

combining an input signal with a local oscillator signal to generate a combined optical signal;

outputting said combined optical signal;

generating an electrical signal in response to said combined optical signal;

processing said electrical signal to determine an optical characteristic of said input signal;

filtering one of said combined optical signal, said input signal, and said local oscillator signal to pass a wavelength band that tracks the wavelength of said local oscillator signal as said local oscillator signal is swept across a range of wavelengths; generating a synchronization signal as said local oscillator signal is swept across said range of wavelengths, wherein said synchronization signal is derived in an open-loop manner from a portion of said local oscillator signal that has not been subjected to said filtering; and

adjusting said filtering in response to said synchronization signal, said filtering being adjusted to track the frequency of said local oscillator signal.

20. The method of claim 19 including an initial step of setting the filter wavelength of an optical pre-selector and the wavelength of said local oscillator signal to match each other before the wavelength of said local oscillator signal is swept across said range of wavelengths and wherein generating said synchronization signal involves generating said synchronization signal in response to wavelength information that is related to said local oscillator signal.

21. A system for optical heterodyne detection comprising:

a first optical path for carrying an input signal;

a second optical path for carrying a local oscillator signal;

optical combining unit, in optical communication with said first and second optical paths, which combines said input signal and said local oscillator signal into a combined optical signal;

a third optical path, in optical communication with said optical combining unit, which carries said combined optical signal;

a photodetector, in optical communication with said third optical path, which receives said combined optical signal from said third optical path;

an optical pre-selector that is optically arranged to filter an optical signal within one of said first, second, and third optical paths, said optical pre-selector having a filter wavelength; and

a pre-selector controller, in drive signal communication with said optical pre-selector, which generates a synchronization signal as said local oscillator signal is swept across said range of wavelengths and which generates a drive signal for said optical pre-selector in response to said synchronization signal, wherein said synchronization signal and said drive signal are derived in an open-loop manner in response to a portion of said local oscillator signal that has not optically interacted with said optical pre-selector.

22. The system of claim 21 wherein the filter wavelength of said optical pre-selector and the wavelength of said local oscillator signal are initially set to match each other and wherein said optical pre-selector exhibits a repeatable relationship between its filter wavelength and an applied drive signal.

Appendix

Evidence (None)

Appendix
Related Proceedings (None)